

## CLAUSEWITZ'S CENTER OF GRAVITY

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It's Not What We Thought

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Over the last two decades, the U.S. military has struggled to understand the center of gravity concept as developed by Carl von Clausewitz and to find practical ways to apply it. In the process, however, each of the services—shaped as they are by different roles, histories, and traditions—has brought individual perspectives to Clausewitz's expression and redefined it in its respective image.

Thus, the U.S. Marine Corps, a relatively small force designed more for winning battles than fighting campaigns or wars, prefers to strike at enemy weaknesses. Accordingly, it initially equated enemy centers of gravity (CoGs) with key vulnerabilities. Recently, however, Marine Corps doctrine has distinguished between CoGs and critical vulnerabilities, considering them different but complementary concepts; CoGs, for the Marines, are now

“any important sources of strength.”<sup>1</sup>

By comparison, the U.S. Air Force, which takes a “targeting” approach to warfare, sees centers of gravity as multiple strategic and operational critical points that it can attack with its bombing assets. Airpower theorists like John Warden, with his notion of “concentric rings,” have in fact identified so many CoGs as to reduce the concept to absurdity.<sup>2</sup>

In contrast, the U.S. Army, which has the role of fighting campaigns and winning wars, sees the enemy's center of gravity as his “source of strength.”<sup>3</sup> Accordingly, the Army tends to look for a single center of gravity, normally in the principal capability that stands in the way of the accomplishment of its own

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mission. In short, the Army considers a “friendly” CoG as that element—a characteristic, capability, or locality—that enables one’s own or allied forces to accomplish their objectives. Conversely, an opponent’s CoG is that element that prevents friendly forces from accomplishing their objectives.

Likewise, the U.S. Navy, as America’s force for winning *maritime* wars, has a center-of-gravity concept that resembles that of the Army and the Marines. Like the Army, the Navy’s doctrine states that a “center of gravity is something the enemy must have to continue military operations—a source of his strength, but not necessarily strong or a strength in itself. There can only be one center of gravity.”<sup>4</sup> Like the Marine Corps, the service it supports most, the Navy has made the linkage between CoGs and vulnerabilities more explicit.<sup>5</sup>

Recently the Joint Staff’s *Doctrine for Joint Operations* (Joint Publication 3-0) attempted—with only limited success—to pull these various perspectives together into a single definition. Joint doctrine currently asserts that the essence of the operational art—a term that Clausewitz would not have used—rests in being able to mass effects against the enemy’s sources of power, or centers of gravity, to gain a decisive advantage.<sup>6</sup> The Joint Staff now defines centers of gravity as those “characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight.”<sup>7</sup> At the strategic level, they can include a military force, an alliance, national will or public support, a set of critical capabilities or functions, or national strategy itself. At the operational level, they are generally the principal *sources of combat power*—such as combat forces that are modern, mobile, or armored—that can ensure, or prevent, accomplishment of the mission. At its core, this definition is capabilities based, despite the presence of terms such as “national will” and “public support.” On this view, all elements—whether leadership, national will, or public opinion—tend to flow from an opponent’s capability to resist.

However, this capabilities-based definition differs substantially from Clausewitz’s own concept, which is effects based. To be sure, the U.S. military is under no obligation to accept a concept developed nearly two centuries ago by a military theorist who was influenced by a long-disappeared cultural environment and used conceptual tools quite different from those available today. Yet each of the services believes that its definition of the center of gravity derives from Clausewitz’s. Presumably the original concept had some special value that attracted each of the services in the first place. That fascination is not misplaced; the concept does have value. Unfortunately, the U.S. military’s misinterpretations of Clausewitz’s original idea have obscured it.

### CLAUSEWITZ'S CENTER OF GRAVITY

The quintessential “cerebral savage,” Clausewitz borrowed a number of intellectual constructs, theories, and concepts from the leading philosophers, scientists, and other thinkers of his day in order to understand and describe what he observed as the various aspects of war.<sup>8</sup> Several of his concepts—friction, polarity, and center of gravity—are analogies or metaphors drawn from the “mechanical sciences” (today’s physics). In particular, the original German text of *Vom Kriege* (*On War*) reveals that Clausewitz used the center-of-gravity metaphor—expressed primarily as *Schwerpunkt* (center of gravity, or main point)—more than fifty times.<sup>9</sup> He appears to have derived his military concept of a center of gravity after hearing a series of lectures by the German physicist Paul Erman, a professor at the University of Berlin and the Prussian *Allgemeine Kriegsschule* (war college). Clausewitz served as director of the war college from 1818 to 1830; he and Erman knew each other cordially.<sup>10</sup>

Clausewitz’s use of the center of gravity in *On War* remains essentially consistent with the concept’s representation in the mechanical sciences. Most English-language sources that cite his definition of a center of gravity draw primarily from one of two passages—pages 485–86 in Book VI (“Defense”), or pages 595–96 in Book VIII (“War Plans”), from the translation of *On War* by Sir Michael Howard and Peter Paret. Unfortunately, that translation, while perhaps the best available, is somewhat misleading. For one thing, it strips away the physics metaphors that Clausewitz used to describe his military concept, metaphors essential to understanding his basic idea. Furthermore, it creates the false impression that centers of gravity derive from “sources” of strength, or that they are themselves “strengths.” Clausewitz never used the word “source” (*Quelle*) in this connection, and he never directly equated the center of gravity to a strength or source of strength. Finally, the Howard-Paret translation makes Clausewitz’s concept appear static, bereft of the intrinsic dynamism he appears to have envisioned.

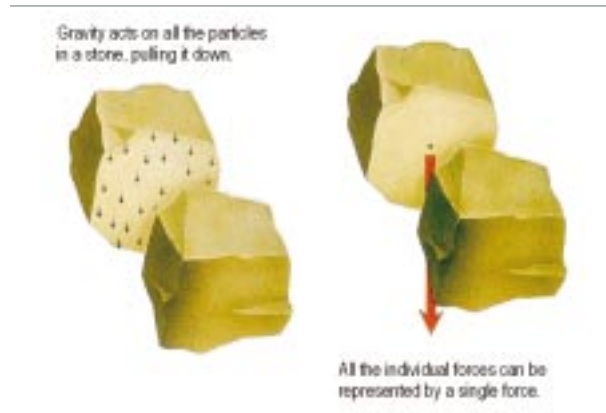
This article will offer alternative translations of select passages that come closer to Clausewitz’s original sense:

It is against that part of the enemy’s forces where they are most concentrated that, if a blow were to occur, the effect would emanate the furthest; furthermore, the greater the mass our own forces possess when they deliver the blow, the more certain we can be of the blow’s success. This simple logic brings us to an analogy that enables us to grasp the idea more clearly, namely, the nature and effect of a center of gravity in the mechanical sciences.<sup>11</sup>

Since in this passage Clausewitz introduces the analogy in a theoretical sense, it is appropriate to review how a center of gravity functions in elementary

physics. In general, a center of gravity represents the point where the forces of gravity can be said to converge within an object, the spot at which the object's weight is balanced in all directions. Striking at or otherwise upsetting the center of gravity can cause the object to lose its balance, or equilibrium, and fall to the

FIGURE 1  
CROSS SECTION OF A ROCK, SHOWING  
HOW FORCES OF GRAVITY OPERATE

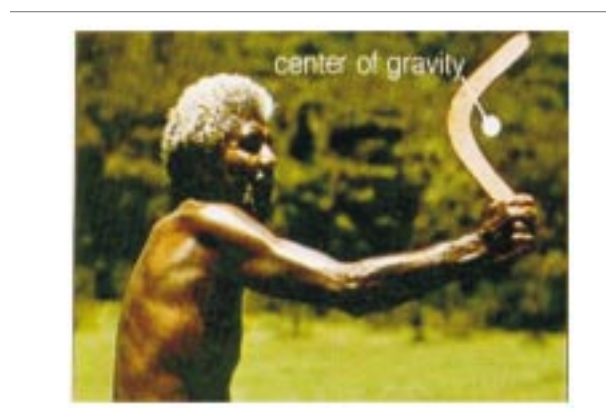


Adapted from Jones, Jones, and Marchington,  
Cambridge Coordinated Science: Physics

ground. A physical object can be thought of in two ways: as a composite of many smaller particles, each of which is acted upon by gravity; or as a single object, acted upon by gravity only at a single point (see figure 1).<sup>12</sup> Understandably, physicists prefer the latter, since it makes other calculations concerning the interaction of force and matter much easier. However, physicists also acknowledge that a center of gravity amounts to little more than a mathematical approximation, since gravity acts simultaneously upon all the points in an object.

Calculating the center of gravity for a simple, symmetrical object—a yardstick, a marble, or a boomerang—is not difficult. The center of gravity of a yardstick is at its middle; the CoG of a sphere lies at its geometric center. Interestingly, the center of gravity of a boomerang, as can be readily calcu-

FIGURE 2  
CoG OF A BOOMERANG



Adapted from Jones, Jones, and Marchington,  
Cambridge Coordinated Science: Physics

lated, lies not on the object itself but in the V-shaped space between the arms (see figure 2).<sup>13</sup> Calculating the center of gravity of more complex objects—such as human beings, with many moving parts—is more difficult. Such objects must be artificially frozen in time and space; if their distribution of weight or position changes, or external weight is added, the CoG moves. For example, a soldier standing at port arms will normally have a CoG in the middle of the pelvis, roughly behind the navel (see figure 3). If the soldier raises his arms, his center of gravity rises to a

point somewhere behind and above the navel. If the soldier dons a rucksack, the CoG will shift again. If he begins to move about rapidly, the center of gravity will

change just as rapidly (see figure 4). If he becomes locked in hand-to-hand combat, the gravitational forces acting on both bodies will affect the CoG of each. A

FIGURE 3  
A STATIONARY SOLDIER'S CoG



physicist could treat both masses as one and calculate a common center of gravity of the total mass; however, if the struggle proceeds at a rapid pace, the CoG will change constantly.

Strictly speaking, therefore, the soldier's center of gravity is not a source of strength. Rather, it represents the point of confluence where gravitational forces come together. A soldier's strength (or power) might derive from muscles, brains, weapons, or any combination of these—all of which relate to the center of gravity only so far as the soldier needs balance to use them. Nor, strictly speaking, is a center of gravity a weakness. A soldier might lack physical strength, be "intellectually challenged," or not have the proper weapons; these condi-

tions would constitute weaknesses, but they have little to do with the soldier's CoG, per se. Nonetheless, although neither a weakness nor a vulnerability, a center of gravity can lie open to attack and, therefore, be vulnerable.

Clausewitz pursues the analogy:

Just as [in physics] the center of gravity is always found where the mass is most concentrated, and just as every blow directed against the body's center of gravity yields the greatest effect, and—moreover—the strongest blow is the one achieved by the

FIGURE 4  
A MOVING SOLDIER'S CoG



center of gravity, the same is true in war. The armed forces of every combatant, whether an individual state or an alliance of states, have a certain unity and thus a certain *interdependence* or *connectivity* [*Zusammenhang*]; and just where such interdependence exists, one can apply the center of gravity concept. Accordingly, there exist *within* these armed forces certain centers of gravity that, by their movement and direction, exert a decisive influence over all other points; and these centers of gravity exist *where* the forces are most concentrated. However, just as in the world of inanimate bodies where the effect on a center of gravity has its proportions and limits determined by the interdependence of the parts, the same is true in war.<sup>14</sup>

The previous two passages, as Clausewitz mentioned, serve only to introduce the basic theoretical concept. Hence, we should take the description of the center of gravity in a metaphorical rather than a literal sense. Unfortunately, U.S. military analysts and

doctrine writers have failed to do that, preferring instead to interpret Clausewitz's center of gravity literally, as a concentration of force.

These passages reveal two important points. First, the CoG concept only applies where a certain "unity" (*Einheit*) and "connectivity" or "interdependence" (*Zusammenhang*) exist between the enemy's forces and the space they occupy. The type and number of centers of gravity the enemy possesses will thus depend upon the degree of connectivity, or overall unity, that his forces possess.<sup>15</sup> Second, Clausewitz's statement that the center of gravity lies "where the forces are most concentrated" refers less to the forces than to the thing that causes them to be concentrated. As in the mechanical sciences, Clausewitz's military CoG is a *focal point*. Hence, combat forces tend to concentrate there and, at times, to emanate from there.

In Book II, chapter 5 ("Critical Analysis"), Clausewitz uses an example that clarifies this point. In the course of illustrating the importance of critical analysis, he argues that the then-common opinion about Napoleon's "Brilliant February" campaign of 1814 was wrong.<sup>16</sup> Napoleon, confronted by advancing Prussian and Austrian forces, first defeated Field Marshal Gebhard von Blücher's Prussian army, then turned on Field Marshal Karl Philip Schwarzenberg's Austrians and drove them back. However, Napoleon failed to achieve a decisive victory in either case; his enemies were able to recover and defeat him a month later, eventually forcing him into exile. Clausewitz maintains that instead of pursuing two (incomplete) victories, Napoleon should have continued hammering Blücher until the Prussian force was decisively defeated. "Blücher," he maintains, "although weaker [numerically] than Schwarzenberg, was nonetheless the more important [adversary] due to his enterprising spirit; hence, the center of gravity lay more with him [Blücher] and *it* pulled the others in his direction."<sup>17</sup> In Clausewitz's view, decisively defeating Blücher—the alliance's center of gravity—would have induced the Austrians to withdraw as well.

This example shows that the CoG concept refers less to the concentrated forces than to the thing—in this case, Blücher—that causes them to concentrate and gives them purpose and direction.<sup>18</sup> Clausewitz also states that centers of gravity have a "sphere of effectiveness" and that their "advance or retreat" can have an effect "upon the rest" of the forces involved.<sup>19</sup> As they advance or withdraw across the battlefield, centers of gravity can "pull" friendly forces with them, as Blücher would have. In other words, to return to the physics analogy, military centers of gravity possess a certain centripetal (as opposed to centrifugal) force. Accordingly, they represent in Clausewitz's mind much more than a mere concentration of forces. Indeed, his concept in general reflects an intrinsic dynamism—not easy to capture on paper but conveyed by the analogy in chapter 1, Book I, of a pendulum actively oscillating among three magnets.<sup>20</sup>

In Book VIII (“War Plans”), Clausewitz discusses the relevance of centers of gravity to war planning. Contrary to some of his critics, Clausewitz does not overextend the analogy by suggesting that several CoGs could exist beyond the enemy army.<sup>21</sup> In fact, the opposite is true. Book VI adheres almost *too* closely to the physics analogy, at the expense of clarity as to military relevance. Book VIII addresses that relevance and reveals the inherent flexibility of the concept:

What theory can admit to thus far is the following: Everything depends upon keeping the dominant conditions of both states in mind. From these emerge a certain center of gravity, a focal point of force and movement, upon which the larger whole depends; and, it is against the enemy’s center of gravity that the collective blow of all power must be directed. . . .

Small things always depend on large ones, the unimportant on the important, the incidental on the essential. This relationship must guide our thoughts. . . .

Alexander the Great, Gustavus Adolphus and Charles XII of Sweden, and Frederick the Great each had their centers of gravity in their respective armies. Had their armies been destroyed, these men would have been remembered as failures. In states with many factions vying for power, the center of gravity lies mainly in the capital; in small states supported by a more powerful one, it lies in the army of the stronger state; in alliances, it lies in the unity formed by common interests; in popular uprisings, it lies in the persons of the principal leaders and in public opinion. The blow must be directed against these things. If the enemy loses his balance because of such a blow, he must not be given time to regain it; blow after blow must follow in the same manner. In other words, the victor must always direct all of his blows in such a way that they will strike at the whole of the enemy, not just a part of him.<sup>22</sup>

This lengthy passage shows that the identity and location of a center of gravity can be perceived only by considering the enemy holistically—that is, by drawing connections between or among an adversary’s (or adversaries’) various parts and then determining what “thing” holds them all together. For example, the armies of Alexander, Gustavus, Charles XII, and Frederick were significant not because they were “sources” of power but because they enabled their leaders to hold their power systems together. In different circumstances, the personalities of key leaders, a state’s capital, or the community of interests of a network of allies perform this centripetal or centralizing function. The salient issue once again is *Zusammenhang*—interdependence, or connectivity.

Clausewitz reinforced this point in chapter 9 of Book VIII, when he explains that reducing the enemy’s force to one center of gravity depends “first, upon the [enemy’s] political connectivity or unity itself” and “second, upon the situation in the theater of war itself, and which of the various enemy armies appear there.”<sup>23</sup> The criterion once again is the extent to which the enemy’s (or enemies’) forces

can operate as a single entity. In World War I, Germany, fighting on two fronts, had to look for two centers of gravity, one Anglo-French and one Russian. Hence, the unity (or lack thereof) formed (or not) by military forces and the geographical spaces in which they have to fight can create more than one CoG.<sup>24</sup> Clausewitz, of course, advocates tracing these back to a single one, whenever possible, but he allows for the possibility that no one, specific CoG might exist. The key question, then, is whether the enemy is so “connected” that actions against him in one area will have a decisive effect in other areas as well.<sup>25</sup>

### AN EFFECTS-BASED APPROACH

Clausewitz’s center of gravity, then, is a “focal point,” neither a strength (or even a source of one) nor a weakness, *per se*. Second, CoGs are found only where sufficient connectivity exists among the various parts of the enemy to form an overarching system (or structure) that acts with a substantial degree of unity, like a physical body. Third, a center of gravity exerts a certain centripetal force that tends to hold an entire system or structure together; thus a blow at the center of gravity would throw an enemy off balance or even cause the entire system (or structure) to collapse. Fourth, using the concept necessitates viewing the enemy holistically.

The U.S. military’s various definitions lack entirely Clausewitz’s sense of “unity” or “connectivity.” By overlooking this essential prerequisite, the U.S. military assumes centers of gravity exist where none might—the enemy may not have sufficient connectivity between its parts to have a CoG. In that case the analysis does little more than focus on the most critical of the enemy’s capabilities.

As previously mentioned, Clausewitz’s CoG concept focuses on achieving a specific effect, the collapse of the enemy. Hence, it is an effects-based approach rather than a capabilities-based one. In this sense, it resembles the emerging concept of “effects-based operations” (EBO) more than the U.S. military’s capabilities-based concept of CoG, with the exception that it seeks only one particular effect—total collapse of the enemy.<sup>26</sup> EBO has the benefit, as General Anthony Zinni (U.S. Marine Corps, retired) has remarked, of forcing political and military planners to focus on the specific effects that they want military (and nonmilitary) action to achieve.<sup>27</sup> Effects-based operations have been characterized as dissolving “the glue” that holds a table together, rather than striking at its individual legs.<sup>28</sup> By implication, then, if Clausewitz’s CoG assumes the enemy constitutes a system, EBO goes a step farther and posits that the enemy is a mappable system.

Like effects-based operations, Clausewitz’s center of gravity concept requires the ability to predict, with reasonable accuracy, how at least first and second-

order effects, and possibly more, can be achieved. That said, it is important to point out that Clausewitz considered the calculation of a CoG a matter of “strategic judgment” (*strategische Urteil*), to be addressed at the highest levels.<sup>29</sup> It is doubtful that he would have approved of current efforts to develop prescriptive formulae.

Furthermore, Clausewitz’s CoGs were “operative” (*wirksame*) only in campaigns or wars designed to defeat the enemy completely.<sup>30</sup> In such wars, military and political objectives are essentially complementary. In limited wars, on the other hand, CoGs (because they by definition relate to the total collapse of the enemy) tend to compete with political objectives. Notwithstanding, U.S. joint doctrine asserts or implies that CoGs exist for all kinds and at all levels of war.<sup>31</sup> Presumably, there are tactical centers of gravity, the defeat of which facilitates the accomplishment of tactical objectives, which in turn contribute to the defeat of operational CoGs, the destruction of which assists in the accomplishment of operational objectives, and so on, until national security objectives are achieved.

Yet to insert a center of gravity into the strategic planning process is contrived and unnecessary. In the Gulf War (1990–91), for example—a limited conflict in which, according to Clausewitz, the CoG concept should not have been applied—the regional commander’s notion of the enemy’s center of gravity did not accord with those of the joint force air component commander. The former saw three distinct CoGs: Saddam Hussein, the Republican Guard, and the Iraqi chemical, biological, and nuclear infrastructure. The air commander identified twelve “target sets” ranging from national leadership and command and control to railroads, airfields, and ports, each of them constituting a center of gravity. As Lieutenant Colonel Joe Purvis, who headed a team of U.S. Army School of Advanced Military Studies graduates who assisted in ground-component planning during the war, later admitted, “The CENTCOM [Central Command, the regional command] staff became more focused on what [the CoG] was as opposed to what do we do with it.”<sup>32</sup> However, even simply translating the war’s strategic objectives—expulsion of Iraqi forces from Kuwait and reduction of Iraqi offensive capability—into operational and tactical objectives would still have identified the capabilities that coalition forces had to defeat in order to be successful.<sup>33</sup>

Clausewitz was a veteran of the Napoleonic Wars, and his emphasis on concentrating forces and energy for a knockout blow derived from his observations that such concentrations often brought about success. He had obvious concerns about the temptation to fritter away resources on ventures that would not bring about a decisive end. These concerns were well placed. For one thing, the army officers of his day were not the school-trained professionals of today; competence varied considerably. In addition, the operational art was not well

developed; there were, for example, no standardized principles of war, such as mass and objective, to encourage commanders to focus their efforts.

Today, military commanders concern themselves less with massing forces than with massing effects. Nonetheless, joint doctrine still maintains that the purpose of identifying a center of gravity is to assist commanders in focusing their efforts and resources, just as in Clausewitz's day. As Brigadier General Wass de Czege (U.S. Army, retired) has explained, "Trying to approach the problem from the perspective of a center of gravity leads you to see very quickly that some vulnerabilities are interesting but a waste of resources because they do not lead anywhere useful in the end."<sup>34</sup> At the same time, joint doctrine acknowledges that CoGs may not always be readily discernible and that they can change at any moment during an operation. If this is true, then why, as civilian analysts like Eliot Cohen have asked, should the U.S. military bother with them?<sup>35</sup> Joint doctrine's answer is to insist that both enemy and friendly centers of gravity be analyzed continuously throughout an operation. However, this solution works only if planning processes can keep pace with change and if political and military leaders have the flexibility to redirect their efforts in midstream.

### SOME RECOMMENDATIONS

As this article has argued, the U.S. military has long misunderstood Clausewitz's concept of center of gravity, believing that its own capabilities-based definitions are closely linked to his effects-based one. Ultimately, capabilities-based definitions merely reflect back what each of the services wants to believe about its own strengths and weaknesses and about those of its potential adversaries. Perhaps that is why no single, reliable method for determining a center of gravity has emerged after two decades of effort.<sup>36</sup>

Confusion has fallen equally upon those wishing to pursue the concept and those who would abandon it.<sup>37</sup> The question arises, in fact, of whether attempting to understand Clausewitz is worth the effort. Do his ideas in general, and those related to the center of gravity in particular, offer anything of enduring value to the strategist or the warfighter today?

As others have pointed out, many of Clausewitz's ideas possess a transcendent quality that makes them relevant not only to his era but always.<sup>38</sup> These enduring insights include friction in war, the culmination of the attack, and the roles of chance and uncertainty. The center of gravity is another. The idea offers something worthwhile for twenty-first-century strategists and warfighters.

However, its application must be judicious. The center of gravity needs to be redefined as a "focal point," not as a strength (or a weakness) or a source of strength. A CoG is more than a critical capability; it is the point where a certain centripetal force seems to exist, something that holds everything else together.

For example, al-Qa'ida cells might operate globally, but they are united by their hatred of apostasy.<sup>39</sup> This hatred, not Osama bin Laden, is their CoG. They apparently perceive the United States and its Western values as the enemy CoG (though they do not use the term) in their war against "apostate" Muslim leaders. Decisively defeating al-Qa'ida will involve neutralizing its CoG, but this will require the use of diplomatic and informational initiatives more than military action.

Commanders and their staffs need to identify where the connections—and the gaps—exist in the enemy's system as a whole before deciding whether a center of gravity exists. The CoG concept does not apply if enemy elements are not connected sufficiently. In other words, successful antiterrorist operations in Afghanistan may not cause al-Qa'ida cells in Europe or Singapore to collapse. Indeed, given the proliferation of chemical, biological, radiological, nuclear, and high-explosive weapons that is expected to occur over the next decade or so, it is dangerous to assume that all the segments of the enemy can be defeated by a single knockout blow. Indeed, the continued proliferation of such weapons could very well make the CoG concept academic.

Nor should the notion of a center of gravity be applied to every kind of war or operation; if it is, the term may become overused and meaningless or be conflated with political-military objectives. The war against terrorism—and al-Qa'ida in particular—is a war to the death; hence, it is the kind of war in which the CoG approach serves a constructive purpose. The Gulf War of 1990–91 was not.

The industrial-age paradigm of warfare, in which the distinction between the strategic, operational, and tactical levels is inviolate, needs to be replaced with one that regards all activities of war as interdependent. Clausewitz did not distinguish between tactical, operational, or strategic centers of gravity; he defined the center of gravity holistically—that is, by the entire system (or structure) of the enemy—not in terms of level of war.

The American military—with the help of a somewhat misleading translation—has obscured the true sense of Clausewitz's center of gravity, but it can still adjust its doctrine to correct those errors. If it does not, the concept will create more confusion and cost more than it is worth. The U.S. military would do better to abandon the center of gravity concept altogether than to apply it in circumstances and ways not appropriate to it. The risks of misapplying it, especially in an environment in which opponents can operate in a wholly decentralized manner but with potentially devastating power, are too great.

## NOTES

1. U.S. Dept. of the Navy, *Warfighting*, Marine Corps Doctrinal Publication 1 (Washington, D.C.: Dept. of the Navy, 20 June 1997), pp. 45–7.
2. U.S. Dept. of the Air Force, *Air Force Doctrine Document 1* (Washington, D.C.: September 1997), p. 79, now uses the joint definition of CoGs cited elsewhere in this article. But see John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense Univ. Press, 1988), pp. 9–10, and “The Enemy as a System,” *Airpower Journal*, Spring 1995, pp. 40–55. Another prominent air power theorist writes, “In essence, Air Power is targeting”; Phillip Meilinger, *10 Propositions Regarding Air Power* (Washington, D.C.: Air Force History and Museums Program, 1995), chap. 4.
3. U.S. Dept. of the Army, *Operations*, Field Manual [hereafter FM] 100-5 (Washington, D.C.: 1993), pp. 6–13; cf. the more recent *Operations*, FM 3-0 (Washington, D.C.: 14 June 2001), pp. 5–7, which now uses the joint definition. The CoG appealed to maneuver theorists, who saw it as something at which to aim the maneuver in the hope of a quick decision, à la the blitzkrieg. Unfortunately, although the Army’s 1986 version of FM 100-5 placed great emphasis on the center of gravity, identifying it as the “key to all operational design,” it also caused a great deal of confusion by equating CoGs to key geographic features, boundaries between army groups, and lines of communication—in other words, to “decisive points” in the Jominian sense; James Schneider and Lawrence Izzo, “Clausewitz’s Elusive Center of Gravity,” *Parameters*, September 1987, pp. 52, 56. William Lind, “The Operational Art,” p. 45, *Marine Corps Gazette*, April 1988, points out that “FM 100-5 arrives at a meaning of center of gravity that can be applied to anything worthy of being attacked” (p. 45). Henri de Jomini defined a decisive point as anything “whose attack or capture would imperil or seriously weaken the enemy”; John Shy, “Jomini,” in *The Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, N.J.: Princeton Univ. Press, 1986), pp. 152–4. The 1993 version of FM 100-5 partially corrected this error but retained the idea that CoGs could be lines of communications.
4. U.S. Dept. of the Navy, *Naval Warfare*, Naval Doctrine Publication 1 (Washington, D.C.: March 1994), p. 35.
5. Ibid.
6. U.S. Dept. of Defense, *Doctrine for Joint Operations*, Joint Publication [hereafter JP] 3-0 (Washington, D.C.: 1 February 1995), p. GL-4. In Book I, chapter 2, of *On War*, Clausewitz concludes that warfare is neither a science nor an art. Its outcomes are too unpredictable to consider it a science; and it involves forces that react when acted upon, so it cannot be an art, like painting. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton Univ. Press, 1989) [hereafter *On War*].
7. Joint Publication 3-0, p. GL-4.
8. For example, Clausewitz borrowed from Immanuel Kant, Georg Hegel, Friedrich Schiller, and Wilhelm Goethe. Peter Paret, *Clausewitz and the State* (New York: Oxford Univ. Press, 1976).
9. *Schwerpunkt* is the term used most frequently; it appears some fifty-three times. Clausewitz also used *Centra gravitatis*, *Kern* (core), and *Zentrum* (center).
10. Paret, *Clausewitz and the State*, pp. 310–1.
11. My translations are followed first by the original German, then by the Howard and Paret translation, for comparison. For this passage: “Gegen den Teil, wo die meisten feindlichen Streitkräfte beisammen sind, wird *derjenige Stoß* geschehen können, dessen glückliche Wirkungen am weitesten reichen; und wir werden dieses Erfolges am meisten gewiß sein, je größer die Masse der eigenen Streitkräfte ist, die wir zu diesem Stoß verwenden. Diese natürliche Vorstellungsreihe führt uns auf ein Bild, in welchem wir sie klarer feststellen können, es ist die Natur und Wirkung des Schwerpunktes in der Mechanik” (Carl von Clausewitz, *Vom Kriege*, 19th ed., [Regensburg: Pustet, 1991], p. 810 [hereafter, *Vom Kriege*]), compare: “The blow from which the broadest and most favorable repercussions can be expected will be aimed against that area where the greatest concentration of enemy troops can be found; the larger the force with which the blow is

struck, the surer its effect will be. This rather obvious sequence leads us to an analogy that will illustrate it more clearly—that is, the nature and effect of a center of gravity” (*On War*, p. 485).

12. Geoff Jones, Mary Jones, and Phillip Marchington, *Cambridge Coordinated Science: Physics* (Cambridge, U.K.: Cambridge Univ. Press, 1993), pp. 52–5. In an environment where gravity does not exist, a center of gravity is replaced by a “center of mass,” where an object’s mass is most heavily concentrated.
13. Jones et al., p. 53.
14. “So wie sich der Schwerpunkt immer da findet, wo die meiste Masse beisammen ist, und wie jeder Stoß gegen den Schwerpunkt der Last am wirksamsten ist, wie ferner der stärkste Stoß mit dem Schwerpunkt der Kraft erhalten wird, so ist es auch im Kriege. Die Streitkräfte jedes Kriegführenden, sei es ein einzelner Staat oder ein Bündnis von Staaten, haben eine gewisse Einheit und durch diese Zusammenhang; wo aber Zusammenhang ist, da treten die Analogien des Schwerpunktes ein. Es gibt also in diesen Streitkräften gewisse Schwerpunkte, deren Bewegung und Richtung über die anderen Punkte entscheidet, und diese Schwerpunkte finden sich da, wo die meisten Streitkräfte beisammen sind. So wie aber in der toten Körperwelt die Wirkung gegen den Schwerpunkt in dem Zusammenhang der Teile ihr Maß und ihre Grenze hat, so ist es auch im Kriege” (*Vom Kriege*, pp. 810–1). Compare: “A center of gravity is always found where the mass is concentrated most densely. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity. The same holds true in war. The fighting forces of each belligerent—whether a single state or an alliance of states—have a certain unity and therefore some cohesion. Where there is cohesion, the analogy of the center of gravity can be applied. Thus, these forces will possess certain centers of gravity, which, by their movement and direction, govern the rest; and those centers of gravity will be found wherever the forces are most concentrated. But in war as in the world of inanimate matter the effect produced on a center of gravity is determined and limited by the cohesion of the parts” (*On War*, pp. 485–6 [emphasis added]). Clausewitz is, of course, wrong in his understanding of physics; as we have seen with the boomerang, a center of gravity can be located where *no* mass exists, a point he perhaps realized by Book VIII, where he lists a number of examples that do not pertain to mass (see note 22 below).
15. Reinforcing this point, Clausewitz elsewhere says, “Weil das Wesen des Krieges Kampf, und die Hauptschlacht der Kampf der Hauptmacht ist, diese immer als den eigentlichen Schwerpunkt des Krieges betrachten” (*Vom Kriege*, p. 453). Compare: “But since the essence of war is fighting, and since the battle is the fight of the main force, the battle must always be considered as the true center of gravity of the war” (*On War*, p. 248). For more on Clausewitz’s notion of “interdependency,” see Antulio J. Echevarria II, “Clausewitz: Toward A Theory of Applied Strategy,” *Defense Analysis*, vol. 11, no. 3 (1995), pp. 229–40, available on the World Wide Web at [www.clausewitz.com](http://www.clausewitz.com) (accessed 4 April 2002).
16. David G. Chandler, *The Campaigns of Napoleon* (New York: Macmillan, 1966), pp. 960–76.
17. “Weil Blücher, obgleich schwächer als Schwarzenberg, doch wegen seines Unternehmungsgeistes der Bedeutendere war, daß in ihm also mehr der Schwerpunkt lag, der das Übrige in seiner Richtung mit fortreißt” (*Vom Kriege*, p. 324 [emphasis added]). Compare: “Even though Blücher was weaker than Schwarzenberg, his enterprising spirit made him more important. The center of gravity lay with him, and he pulled the other forces in his direction” (*On War*, p. 163).
18. One could also make a case that Blücher’s personal desire to defeat the French was the ultimate force. But this goes beyond what is necessary to prove the point that Clausewitz’s CoG is more than just a concentration of force.
19. “Diese *Centra gravitatis* in der feindlichen Kriegsmacht zu unterscheiden, ihre Wirkungskreise zu erkennen, ist also ein Hauptakt des strategischen Urteils. Man wird sich nämlich jedesmal fragen müssen, welche Wirkungen das Vorgehen und Zurückgehen des einen Teiles der gegenseitigen Streitkräfte

auf die übrigen hervorbringen wird" (*Vom Kriege*, pp. 810–1). Compare: "It is therefore a major act of strategic judgment to distinguish these centers of gravity in the enemy's forces and to identify their spheres of effectiveness. One will constantly be called upon to estimate the effect that an advance or a retreat by part of the forces on either side will have upon the rest" (*On War*, p. 486).

20. Alan D. Beyerchen, "Clausewitz, Nonlinearity and the Unpredictability of War," *International Security*, Winter 1992, pp. 59–90.

21. Schneider and Izzo maintain (p. 49) that Clausewitz carried the analogy "too far" in Book VIII. Unfortunately, their views merely reflect their own predilections about what a CoG *ought* to be.

22. "Alexander, Gustav Adolf, Karl XII., Friedrich der Große hatten ihren Schwerpunkt in ihrem Heer, wäre dies zertrümmert worden, so würden sie ihre Rolle schlecht ausgespielt haben; bei Staaten, die durch innere Parteiungen zerrissen sind, liegt er meistens in der Hauptstadt; bei kleinen Staaten, die sich an mächtige stützen, liegt er im Heer dieser Bundesgenossen; bei Bündnissen liegt er in der Einheit des Interesses; bei Volksbewaffnung in der Person der Hauptführer und in der öffentlichen Meinung. Gegen diese Dinge muß der Stoß gerichtet sein. Hat der Gegner dadurch das Gleichgewicht verloren, so muß ihm keine Zeit gelassen werden, es wieder zu gewinnen; der Stoß muß immer in dieser Richtung fortgesetzt werden, oder mit anderen Worten, der Sieger muß ihn immer ganz und das Ganze nicht gegen einen Teil des Gegners richten" (*Vom Kriege*, pp. 976–7). Compare: "For Alexander, Gustavus Adolphus, Charles XII, and Frederick the Great, the center of gravity was their *army*. If the army had been destroyed, they would all have gone down in history as failures. In countries subject to domestic strife, the center of gravity is generally the *capital*. In small countries that rely on large ones, it is usually the army of their protector. Among alliances, it lies in the *community of interest*, and in popular uprisings it is the *personalities of the leaders and public opinion*. It is against these that our energies should be directed. If the enemy is thrown off balance, he must not be given time to recover. Blow after blow must be aimed in the

same direction: the victor, in other words, must strike with all his strength and not just against a fraction of the enemy's" (*On War*, pp. 595–6).

23. "Das Reduzieren der feindlichen Macht auf einen Schwerpunkt hängt ab: Erstens von dem politischen Zusammenhang derselben. . . . Zweitens von der Lage des Kriegstheaters, auf welchem die verschiedenen feindlichen Heere erschienen" (*Vom Kriege*, pp. 1009–10). Compare: "The task of reducing the sources of enemy strength to a single center of gravity will depend on: 1. The distribution of the enemy's political power. . . . 2. The situation in the theater of war where the various armies are operating" (*On War*, p. 617). Note that "source" (*Quelle*) does not appear in the original.
24. Clausewitz also lays out two war-planning principles, the first of which involves the CoG. In my translation, "The first principle is: To trace the full weight [*Gewicht*] of the enemy's power [*Macht*] to as few centers of gravity as possible, when feasible, to one; and, at the same time, to reduce the blow against these centers of gravity to as few major actions as possible, when feasible, to one. And, finally, to keep all subordinate actions as subordinate as possible. In a word, the first principle is: To act with the utmost concentration. The second principle is: To act as rapidly as possible, permitting no delay or detour without substantial justification." Compare: "Der erste ist: das Gewicht der feindlichen Macht auf so wenig Schwerpunkte als möglich zurückzuführen, wenn es sein kann, auf einen; wiederum den Stoß gegen diese Schwerpunkte auf so wenig Haupthandlungen als möglich zurückzuführen, wenn es sein kann, auf eine; endlich alle untergeordnete Handlungen so untergeordnet als möglich zu halten. Mit einem Wort, der erste Grundsatz ist: so konzentriert als möglich zu handeln. Der zweite Grundsatz: so schnell als möglich zu handeln, also keinen Aufenthalt und keinen Umweg ohne hinreichenden Grund" (*Vom Kriege*, p. 1009). Further compare: "The first principle is that the ultimate substance of enemy strength must be traced back to the fewest possible sources, and ideally to one alone. The attack on these sources must be compressed into the fewest possible actions—

- again, ideally, into one. Finally, all minor actions must be subordinated as much as possible. In short the first principle is: act with the utmost concentration. The second principle is: act with the utmost speed. No halt or detour must be permitted without good cause" (*On War*, p. 617). Note again that contrary to the Howard and Paret translation, the word "source" does not appear in the original.
25. Clausewitz's center of gravity has been called a linear concept (see Beyerchen, p. 87), because his description employs a relationship—CoG against CoG—seemingly based on directly proportional effects. Yet in some respects it implies nonlinearity as well, because the center of gravity is not always a physical mass. Destruction of something intangible—such as an alliance's community of interests—or of something relatively small—such as a political or military leader—can bring down the enemy's entire edifice.
  26. U.S. Joint Forces Command, *Rapid Decisive Operations White Paper*, draft dated 16 February 2001 (Norfolk, Va.: J9 Joint Futures Lab, 2001) [hereafter RDO]. It defines effects-based operation as "a process for obtaining a desired strategic outcome or 'effect' on the enemy through the synergistic, multiplicative, and cumulative application of the full range of military and other national capabilities at the tactical, operational, and strategic levels." An effect is defined as the "physical, functional, or psychological outcome, event, or consequence that results from specific military and non-military actions" (p. 20).
  27. Christian Lowe, "In Exercise, U.S. Military Practices Unconventional Warfare," *Defense Week*, 21 May 2001, p. 2. For a more detailed critique of RDO see Antulio J. Echevarria II, *Rapid Decisive Operations: An Assumptions-Based Critique* (Carlisle, Penna.: Strategic Studies Institute, 2001).
  28. Lowe, p. 2.
  29. *Vom Kriege*, p. 324. Cf. *On War*, p. 163.
  30. "Denn nur durch diese Entscheidung werden die Schwerpunkte der gegenseitigen Macht und die von ihnen ausgehenden Kriegstheater wirksame Dinge" (*Vom Kriege*, p. 813). Compare: "It is the decision that changes the centers of gravity on each side, and the operational theaters they create, into active agents" (*On War*, p. 488).
  31. JP 3-0, pp. III-20 through III-21.
  32. Cited in Seow Hiang Lee, "Center of Gravity or Center of Confusion: Understanding the Mystique," Wright Flyer Paper 10 (Maxwell Air Force Base, Ala.: Air Command and Staff College, 1999), pp. 18–9.
  33. To condense the strategic objectives. The objectives for the Gulf War as outlined by President George H. W. Bush were: withdrawal of Iraqi forces from Kuwait; restoration of legitimate government in Kuwait; assuring security and stability of the Persian Gulf region; and protecting American lives. Eliot Cohen et al., *Gulf War Air Power Survey*, vol. 1, *Planning and Command and Control* (Washington, D.C.: U.S. Government Printing Office, 1993), pp. 83–4.
  34. Huba Wass de Czege [Brig. Gen., USA, (Ret.)], "Clausewitz: Historical Theories Remain Sound Compass References: The Catch Is Staying on Course," *Army*, September 1988, p. 42.
  35. Eliot A. Cohen, "Strategy: Causes, Conduct, and Termination of War," in *Security Studies for the 21st Century*, ed. Richard H. Shultz, Jr., Roy Godson, George H. Quester (Washington, D.C.: Brassey's, 1997), pp. 364–6.
  36. One of the better-known and detailed attempts was Dr. Joseph Strange's "CG-CC-CR-CV" concept, by which a "CG" (center of gravity) must have "critical capabilities" (CCs) to be a true, military CoG. Those CCs, in turn, have "critical requirements" (CRs)—such as lines of communication—that enable the CCs to keep functioning. Leaving a CR—such as, in Korea in 1950, the Inchon-Seoul transportation hub—inadequately protected creates a "critical vulnerability" (CV) that friendly forces can exploit to defeat the enemy's CG. Dr. Strange thus effectively linked centers of gravity—which were in reality critical capabilities—to critical vulnerabilities. Joe Strange, *Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*, Perspectives on Warfighting Series 4 (Quantico, Va.: Marine Corps Association, 1996). Strange correctly maintained that service definitions of CoG (with the exception of the Army's) were flawed and imprecise. They tended to equate CoGs with vulnerabilities rather than with strengths, and

they paid too little attention to psychological centers of power.

Other methods of identifying centers of gravity are too numerous to list here in their entirety, but they include the “strategic helix” method, which involves attacking all potential centers of gravity until the real one is hit and reveals itself by the effects that ensue. This method, which is in effect “recon by destruction” and assumes unlimited resources, is discussed in detail by Lee (pp. 27–8), who credits Phillip Meilinger for developing it. Another approach, the “onion method,” amounts to little more than eating one’s way through the multiple layers of the enemy’s national power to get at the CoG; Colin Agee, *Peeling the Onion: The Iraqi’s [sic] Center of Gravity* (Fort Leavenworth, Kans.: School of Advanced Military Studies, 1992), pp. 26–7. Both methods assume that an enemy CoG in

fact exists, somewhere inside the “helix” or “onion.”

37. Steven Metz and Frederick M. Downey, “Centers of Gravity and Strategic Planning,” *Military Review*, April 1988, pp. 22–33, argue that the concept can be useful but that much work needs to be done to make it so. In contrast, T. M. Kriwanek, *The Operational Center of Gravity* (Fort Leavenworth, Kans.: School of Advanced Military Studies, 1986), pp. 20–1, argues that Clausewitz’s ideas, rooted in industrial-age warfare, have little to offer to the future. Both are victims of the Howard and Paret translation.
38. Cohen, “Strategy,” p. 365.
39. “Al-Qa’ida (the Base),” *International Policy Institute for Counter-Terrorism*, on the World Wide Web at [www.ict.org.il/inter\\_ter](http://www.ict.org.il/inter_ter) (accessed 3 April 2002).